King County Environmental Lab Analytical Report

PROJECT: 423056-160

	NFK501	NFK502	NFK503	NFK504
Locator:	NFK501	NFK502	NFK503	NFK504
Client Loc:	Norfolk CSO outfall channel, inshore	End of Norfolk CSO outfall channel	End of Boeing storm drain channel	Upriver of CSO & storm drain channe
Sampled:	Apr 23, 1999	Apr 23, 1999	Apr 23, 1999	Apr 23, 1999
Lab ID:	L15421-1	L15421-2	L15421-3	L15421-4
Matrix:	SALTWTRSED	SALTWTRSED	SALTWTRSED	SALTWTRSED
% Solids:	76.9	77.4	77	77.6

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
			- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis		
COMBINED LABS																				
M=CV ASTM D422																				
p+0.00 *	3.3		0.1		%	3		0.1		%	1		0.1		%	3.3		0.1		%
p+1.00 *	38		0.1		%	32		0.1		%	28		0.1		%	44		0.1		%
p+10.0 *		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%
p+10.0(more than) *		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%
p+2.00 *	46		0.1		%	56		0.1		%	55		0.1		%	46		0.1		%
p+3.00 *	4.3		0.1		%	4.1		0.1		%	9		0.1		%	3		0.1		%
p+4.00 *	7		0.1		%	0.4		0.1		%	1.3		0.1		%	0.4		0.1		%
p+5.00 *	1		0.1		%	4.7		0.1		%	5.4		0.1		%	2.9		0.1		%
p+6.00 *		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%
p+7.00 *		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%
p+8.00 *		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%
p+9.00 *		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%
p-1.00 *	0.8	E	0.1		%	0.4	E	0.1		%	0.4	E	0.1		%	0.4	E	0.1		%
p-2.00 *		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%
p-2.00(less than) *		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%		<MDL	0.1		%
M=CV SM2540-G (03-01-001-001)																				
Total Solids *	76.9		0.005	0.01	%	77.4		0.005	0.01	%	77		0.005	0.01	%	77.6		0.005	0.01	%
M=CV SM5310-B (03-04-001-000)																				
Total Organic Carbon	1760		6.5	13	mg/Kg	1210		6.5	12.9	mg/Kg	3180		6.5	13	mg/Kg	1260		6.4	12.9	mg/Kg
M=ES NONE																				
Sample Depth *	2				m	2.5				m	2.5				m	2.3				m
Sample Start Time *	1300				hr	1334				hr	1354				hr	1423				h
Sampling Method	26000				none	26000				none	26000				none	26000				none
Sediment Sampling Depth *	13				cm	14				cm	15				cm	16				cm
Sediment Type	30N30				none	30N30				none	30N30				none	30N30				none
Tidal Condition	E				none	E				none	E				none	E				none
Tide Height *	7.6				ft	7				ft	6.2				ft	5.6				ft
M=MT EPA 245.5 (06-01-004-001)																				
Mercury, Total, CVAA	0.055	<RDL	0.026	0.259	mg/Kg	0.089	<RDL	0.026	0.257	mg/Kg	0.066	<RDL	0.026	0.26	mg/Kg	0.072	<RDL	0.026	0.254	mg/Kg
M=MT EPA3050A/6010B (60-20-004-002)																				
Aluminum, Total, ICP	9770	L	6.5	32.5	mg/Kg	9730	L	6.2	31.3	mg/Kg	9420	L	6.4	31.8	mg/Kg	9330	L	6.2	30.7	mg/Kg
Arsenic, Total, ICP		<MDL	3.3	16.3	mg/Kg	3.7	<RDL	3.1	15.6	mg/Kg		<MDL	3.2	16	mg/Kg	3.5	<RDL	3.1	15.3	mg/Kg
Beryllium, Total, ICP	0.11	<RDL	0.065	0.325	mg/Kg	0.14	<RDL	0.062	0.313	mg/Kg	0.11	<RDL	0.064	0.318	mg/Kg	0.12	<RDL	0.062	0.307	mg/Kg
Cadmium, Total, ICP	0.2	<RDL,L	0.2	0.977	mg/Kg	0.21	<RDL,L	0.19	0.938	mg/Kg		<MDL,L	0.19	0.955	mg/Kg	0.21	<RDL,L	0.18	0.921	mg/Kg
Chromium, Total, ICP	12.9		0.33	1.63	mg/Kg	13		0.31	1.56	mg/Kg	14.7		0.32	1.6	mg/Kg	12.2		0.31	1.53	mg/Kg
Copper, Total, ICP	11.4		0.26	1.3	mg/Kg	12.2		0.25	1.25	mg/Kg	10.5		0.26	1.27	mg/Kg	11.2		0.24	1.23	mg/Kg
Iron, Total, ICP	18900	B	3.3	16.3	mg/Kg	19800	B	3.2	31.3	mg/Kg	17700	B	3.2	16	mg/Kg	18300	B	3.1	15.3	mg/Kg
Lead, Total, ICP	4.2	<RDL	2	9.77	mg/Kg	5	<RDL	1.9	9.38	mg/Kg	4.4	<RDL	1.9	9.55	mg/Kg	4.6	<RDL	1.8	9.21	mg/Kg
Manganese, Total, ICP	263	G	0.13	0.651	mg/Kg	226	G	0.13	0.625	mg/Kg	242	G	0.13	0.636	mg/Kg	237	G	0.12	0.615	mg/Kg
Nickel, Total, ICP	12.7		1.3	6.51	mg/Kg	12.9		1.3	6.25	mg/Kg	12.6		1.3	6.36	mg/Kg	12.9		1.2	6.15	mg/Kg
Selenium, Total, ICP		<MDL	3.3	16.3	mg/Kg		<MDL	3.1	15.6	mg/Kg		<MDL	3.2	16	mg/Kg		<MDL	3.1	15.3	mg/Kg
Silver, Total, ICP		<MDL	0.26	1.3	mg/Kg		<MDL	0.25	1.25	mg/Kg		<MDL	0.26	1.27	mg/Kg		<MDL	0.24	1.23	mg/Kg
Thallium, Total, ICP		<MDL	13	65.1	mg/Kg		<MDL	13	62.5	mg/Kg		<MDL	13	63.6	mg/Kg		<MDL	12	61.5	mg/Kg
Zinc, Total, ICP	46		0.33	1.63	mg/Kg	43.2		0.31	1.56	mg/Kg	42.1		0.32	1.6	mg/Kg	44.2		0.31	1.53	mg/Kg

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% Solids:	76.9	77.4	77	77.6

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis			
COMBINED LABS																				
M=OR EPA 3550B/8082 (7-3-03-002)																				
Aroclor 1016		<MDL	22	43.3	ug/Kg		<MDL	22	43	ug/Kg		<MDL	22	43.2	ug/Kg		<MDL	22	42.9	ug/Kg
Aroclor 1221		<MDL	22	43.3	ug/Kg		<MDL	22	43	ug/Kg		<MDL	22	43.2	ug/Kg		<MDL	22	42.9	ug/Kg
Aroclor 1232		<MDL	22	43.3	ug/Kg		<MDL	22	43	ug/Kg		<MDL	22	43.2	ug/Kg		<MDL	22	42.9	ug/Kg
Aroclor 1242		<MDL	22	43.3	ug/Kg		<MDL	22	43	ug/Kg		<MDL	22	43.2	ug/Kg		<MDL	22	42.9	ug/Kg
Aroclor 1248		<MDL	22	43.3	ug/Kg		<MDL	22	43	ug/Kg		<MDL	22	43.2	ug/Kg		<MDL	22	42.9	ug/Kg
Aroclor 1254		<MDL	22	43.3	ug/Kg		<MDL	22	43	ug/Kg		<MDL	22	43.2	ug/Kg		<MDL	22	42.9	ug/Kg
Aroclor 1260		<MDL	22	43.3	ug/Kg		<MDL	22	43	ug/Kg		<MDL	22	43.2	ug/Kg		<MDL	22	42.9	ug/Kg
M=OR EPA 3550B/8270C (7-3-01-004)																				
1,2-Diphenylhydrazine		<MDL	69	139	ug/Kg		<MDL	68	138	ug/Kg		<MDL	69	139	ug/Kg		<MDL	68	138	ug/Kg
2,4,5-Trichlorophenol		<MDL,G	140	277	ug/Kg		<MDL,G	140	275	ug/Kg		<MDL,G	140	277	ug/Kg		<MDL,G	140	274	ug/Kg
2,4,6-Trichlorophenol		<MDL,G	140	277	ug/Kg		<MDL,G	140	275	ug/Kg		<MDL,G	140	277	ug/Kg		<MDL,G	140	274	ug/Kg
2,4-Dichlorophenol		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
2,4-Dimethylphenol		<MDL,G,X	35	69.3	ug/Kg		<MDL,G,X	35	68.9	ug/Kg		<MDL,G,X	35	69.2	ug/Kg		<MDL,G,X	35	68.7	ug/Kg
2,4-Dinitrophenol		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg
2,4-Dinitrotoluene		<MDL	14	27.7	ug/Kg		<MDL	14	27.5	ug/Kg		<MDL	14	27.7	ug/Kg		<MDL	14	27.4	ug/Kg
2,6-Dinitrotoluene		<MDL	14	27.7	ug/Kg		<MDL	14	27.5	ug/Kg		<MDL	14	27.7	ug/Kg		<MDL	14	27.4	ug/Kg
2-Chloronaphthalene		<MDL	21	34.7	ug/Kg		<MDL	21	34.5	ug/Kg		<MDL	21	34.7	ug/Kg		<MDL	21	34.4	ug/Kg
2-Chlorophenol		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg
2-Methylnaphthalene		<MDL,G	56	104	ug/Kg		<MDL,G	56	103	ug/Kg		<MDL,G	56	104	ug/Kg		<MDL,G	55	103	ug/Kg
2-Methylphenol		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
2-Nitroaniline		<MDL	140	208	ug/Kg		<MDL	140	207	ug/Kg		<MDL	140	208	ug/Kg		<MDL	140	206	ug/Kg
2-Nitrophenol		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
3,3'-Dichlorobenzidine		<MDL,X	35	69.3	ug/Kg		<MDL,X	35	68.9	ug/Kg		<MDL,X	35	69.2	ug/Kg		<MDL,X	35	68.7	ug/Kg
3-Nitroaniline		<MDL,G	140	208	ug/Kg		<MDL,G	140	207	ug/Kg		<MDL,G	140	208	ug/Kg		<MDL,G	140	206	ug/Kg
4,6-Dinitro-O-Cresol		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg
4-Bromophenyl Phenyl Ether		<MDL	14	20.8	ug/Kg		<MDL	14	20.7	ug/Kg		<MDL	14	20.8	ug/Kg		<MDL	14	20.6	ug/Kg
4-Chloro-3-Methylphenol		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg
4-Chloroaniline		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg
4-Chlorophenyl Phenyl Ether		<MDL	21	34.7	ug/Kg		<MDL	21	34.5	ug/Kg		<MDL	21	34.7	ug/Kg		<MDL	21	34.4	ug/Kg
4-Methylphenol		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
4-Nitroaniline		<MDL,G	140	208	ug/Kg		<MDL,G	140	207	ug/Kg		<MDL,G	140	208	ug/Kg		<MDL,G	140	206	ug/Kg
4-Nitrophenol		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg
Acenaphthene		<MDL	14	27.7	ug/Kg		<MDL	14	27.5	ug/Kg		<MDL	14	27.7	ug/Kg		<MDL	14	27.4	ug/Kg
Acenaphthylene		<MDL	21	34.7	ug/Kg		<MDL	21	34.5	ug/Kg		<MDL	21	34.7	ug/Kg		<MDL	21	34.4	ug/Kg
Aniline		<MDL,X	69	139	ug/Kg		<MDL,X	68	138	ug/Kg		<MDL,X	69	139	ug/Kg		<MDL,X	68	138	ug/Kg
Anthracene		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.5	ug/Kg		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.4	ug/Kg
Benzidine		<MDL,X	830	1660	ug/Kg		<MDL,X	830	1650	ug/Kg		<MDL,X	830	1660	ug/Kg		<MDL,X	820	1650	ug/Kg
Benzo(a)anthracene		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.5	ug/Kg		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.4	ug/Kg
Benzo(a)pyrene		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
Benzo(b)fluoranthene		<MDL	56	104	ug/Kg		<MDL	56	103	ug/Kg		<MDL	56	104	ug/Kg		<MDL	55	103	ug/Kg
Benzo(g,h,i)perylene		<MDL,G	35	69.3	ug/Kg	75.7	G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg	70.5	G	35	68.7	ug/Kg
Benzo(k)fluoranthene		<MDL	56	104	ug/Kg		<MDL	56	103	ug/Kg		<MDL	56	104	ug/Kg		<MDL	55	103	ug/Kg
Benzoic Acid		<MDL,G	140	208	ug/Kg		<MDL,G	140	207	ug/Kg		<MDL,G	140	208	ug/Kg		<MDL,G	140	206	ug/Kg
Benzyl Alcohol		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg

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Lab ID:	L15421-1	L15421-2	L15421-3	L15421-4
Matrix:	SALTWTRSED	SALTWTRSED	SALTWTRSED	SALTWTRSED
% Solids:	76.9	77.4	77	77.6

Parameters	NFK501 Value	Qual	MDL	RDL	Units	NFK502 Value	Qual	MDL	RDL	Units	NFK503 Value	Qual	MDL	RDL	Units	NFK504 Value	Qual	MDL	RDL	Units
		- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis			
COMBINED LABS																				
Benzyl Butyl Phthalate		<MDL	21	34.7	ug/Kg		<MDL	21	34.5	ug/Kg		<MDL	21	34.7	ug/Kg		<MDL	21	34.4	ug/Kg
Bis(2-Chloroethoxy)Methane		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
Bis(2-Chloroethyl)Ether		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.5	ug/Kg		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.4	ug/Kg
Bis(2-Chloroisopropyl)Ether		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg		<MDL,G	69	139	ug/Kg		<MDL,G	68	138	ug/Kg
Bis(2-Ethylhexyl)Phthalate		<MDL	21	34.7	ug/Kg		<MDL	21	34.5	ug/Kg		<MDL	21	34.7	ug/Kg		<MDL	21	34.4	ug/Kg
Caffeine		<MDL	6.9	34.7	ug/Kg		<MDL	6.8	34.5	ug/Kg		<MDL	6.9	34.7	ug/Kg		<MDL	6.8	34.4	ug/Kg
Carbazole		<MDL	35	69.3	ug/Kg		<MDL	35	68.9	ug/Kg		<MDL	35	69.2	ug/Kg		<MDL	35	68.7	ug/Kg
Chrysene		<MDL	21	34.7	ug/Kg		<MDL	21	34.5	ug/Kg		<MDL	21	34.7	ug/Kg		<MDL	21	34.4	ug/Kg
Coprostanol		<MDL,G	350	693	ug/Kg		<MDL,G	350	689	ug/Kg		<MDL,G	350	692	ug/Kg		<MDL,G	350	687	ug/Kg
Dibenzo(a,h)anthracene		<MDL,G	56	104	ug/Kg		<MDL,G	56	103	ug/Kg		<MDL,G	56	104	ug/Kg		<MDL,G	55	103	ug/Kg
Dibenzofuran		<MDL	35	69.3	ug/Kg		<MDL	35	68.9	ug/Kg		<MDL	35	69.2	ug/Kg		<MDL	35	68.7	ug/Kg
Diethyl Phthalate		<MDL	35	69.3	ug/Kg		<MDL	35	68.9	ug/Kg		<MDL	35	69.2	ug/Kg		<MDL	35	68.7	ug/Kg
Dimethyl Phthalate		<MDL	14	20.8	ug/Kg		<MDL	14	20.7	ug/Kg		<MDL	14	20.8	ug/Kg		<MDL	14	20.6	ug/Kg
Di-N-Butyl Phthalate		<MDL	35	69.3	ug/Kg		<MDL	35	68.9	ug/Kg		<MDL	35	69.2	ug/Kg		<MDL	35	68.7	ug/Kg
Di-N-Octyl Phthalate		<MDL	21	34.7	ug/Kg		<MDL	21	34.5	ug/Kg		<MDL	21	34.7	ug/Kg		<MDL	21	34.4	ug/Kg
Fluoranthene		<MDL,G	21	41.6	ug/Kg		<MDL,G	21	41.3	ug/Kg		<MDL,G	21	41.6	ug/Kg		<MDL,G	21	41.2	ug/Kg
Fluorene		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.5	ug/Kg		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.4	ug/Kg
Hexachlorobutadiene		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
Hexachlorocyclopentadiene		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
Hexachloroethane		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
Indeno(1,2,3-Cd)Pyrene		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
Isophorone		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
Naphthalene		<MDL,G	56	104	ug/Kg		<MDL,G	56	103	ug/Kg		<MDL,G	56	104	ug/Kg		<MDL,G	55	103	ug/Kg
Nitrobenzene		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
N-Nitrosodimethylamine		<MDL	140	203	ug/Kg		<MDL	140	207	ug/Kg		<MDL	140	208	ug/Kg		<MDL	140	206	ug/Kg
N-Nitrosodi-N-Propylamine		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
N-Nitrosodiphenylamine		<MDL	35	69.3	ug/Kg		<MDL	35	68.9	ug/Kg		<MDL	35	69.2	ug/Kg		<MDL	35	68.7	ug/Kg
Pentachlorophenol		<MDL,G	35	69.3	ug/Kg		<MDL,G	35	68.9	ug/Kg		<MDL,G	35	69.2	ug/Kg		<MDL,G	35	68.7	ug/Kg
Phenanthrene	21	<RDL,G	21	34.7	ug/Kg		<MDL,G	21	34.5	ug/Kg		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.4	ug/Kg
Phenol		<MDL,G	140	203	ug/Kg		<MDL,G	140	207	ug/Kg		<MDL,G	140	208	ug/Kg		<MDL,G	140	206	ug/Kg
Pyrene		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.5	ug/Kg		<MDL,G	21	34.7	ug/Kg		<MDL,G	21	34.4	ug/Kg
M=OR EPA3550B/8270C SIM(7-3-01-004)																				
1,2,4-Trichlorobenzene		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.72	ug/Kg		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.71	ug/Kg
1,2-Dichlorobenzene		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.72	ug/Kg		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.71	ug/Kg
1,3-Dichlorobenzene		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.72	ug/Kg		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.71	ug/Kg
1,4-Dichlorobenzene		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.72	ug/Kg		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.71	ug/Kg
Hexachlorobenzene		<MDL,G	0.9	1.73	ug/Kg	0.97	<RDL,G	0.89	1.72	ug/Kg		<MDL,G	0.9	1.73	ug/Kg		<MDL,G	0.89	1.71	ug/Kg

* Not converted to dry weight basis for this parameter

KING COUNTY ENVIRONMENTAL LABORATORY
QUALITY ASSURANCE REVIEW

for

ESTUARINE SEDIMENT ANALYTICAL DATA

NORFOLK CSO SEDIMENT REMEDIATION PROJECT
FIVE-YEAR MONITORING PROGRAM
APRIL 1999 MONITORING EVENT

August 11, 1999

King County Environmental Laboratory
322 West Ewing Street
Seattle, Washington 98119-1507
(206) 684-2300

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August 18, 1999

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INTRODUCTION

This quality assurance (QA) review accompanies data submitted in connection with estuarine sediment sampling and analysis conducted by the King County Environmental Laboratory (KC Lab) for the Norfolk Combined Sewer Overflow (CSO) Sediment Remediation Project. The QA review is organized into the four sections listed below.

- General Comments
- Conventional Analyses
- Metal Chemistry
- Organic Chemistry

An overview of the approach used for the QA review is detailed in the *General Comments* section. Additional information specific to each analysis is included in the appropriate analytical section.

This QA review has been primarily conducted in accordance with guidelines established through the Puget Sound Dredged Disposal Analysis (PSDDA) program, outlined in *Puget Sound Dredged Disposal Analysis Guidance Manual, Data Quality Evaluation for Proposed Dredged Material Disposal Projects*. Other approaches incorporated in the QA review have been established through collaboration between the King County Environmental Laboratory (KC Laboratory) and the Washington State Department of Ecology (Ecology) Sediment Management Unit.

GENERAL COMMENTS

Scope of Samples Submitted
This QA review is associated with estuarine sediment samples collected in April 1999 as part of the Norfolk CSO Sediment Remediation Project. The five-year monitoring program is designed to monitor the backfill material at the remediation site for possible re-contamination from the Norfolk CSO or other adjacent outfalls.

Except where noted in the subcontracting sections of this QA review, all analyses have been conducted by the KC Lab. Sediment analytical data are reported with associated data qualifiers and have undergone QA1 review, as summarized in this narrative report.

Completeness
Completeness has been evaluated for this data submission and QA review by considering the following criteria:

- Comparing reported data to the planned project analyses summarized in Table 1.
- Compliance with storage conditions and holding times.
- Frequency of analysis of the complete set of quality control (QC) samples outlined in Table 2.

Subcontracted Analyses
Analyses that have been subcontracted and the issues associated with these subcontracted analyses are noted in this narrative.

Methods
Analytical methods are noted in the applicable analytical sections of this QA review.

Target Lists
The reported target lists have been compared to the target analytes listed in *Table 1 - Marine Sediment Quality Standards Chemical Criteria* and *Table 3 - Puget Sound Marine Sediment Cleanup Screening Levels Chemical Criteria* contained in Chapter 173-204 WAC. Target lists may also be compared to the PSDDA *Chemicals of Concern* list, if applicable.

Detection Limits
The KC Laboratory distinguishes between the reporting detection limit (RDL) and the method detection limit (MDL).

- The RDL is defined as *the minimum concentration of a chemical constituent that can be reliably quantified.*
- The MDL is defined as *the minimum concentration of a chemical constituent that can be detected.*

Some subcontracted laboratory data are available with an MDL only, in accordance with the subcontracting laboratory policies. All analytical data are reported with a numeric result and/or detection limit(s).

Storage Conditions and Holding Times
Storage conditions and holding times have been evaluated using guidelines established during the Third Annual PSDDA Review Meeting. The approach used to evaluate Total Organic Carbon for holding time has been established between the KC Laboratory and Ecology during previous QA1 review efforts.

Method Blanks
Method blank results have been used to evaluate the possible laboratory contamination of samples. Method blank results have been reviewed for the presence of analytes detected at or greater than the MDL.

Standard Reference Materials and Check Standards
Standard reference material (SRM) or check standard recoveries have been used to evaluate possible low or high analytical bias on a batch-specific basis. SRM or check standard analysis is included with metal, organic and selected conventional parameters (see Table 2). Standard reference materials are purchased from outside agencies and generally have a certified analyte value. Check standards are generally prepared by the analytical laboratory as part of overall quality control.

Matrix Spikes
Matrix spike recoveries have been used to evaluate possible low or high analytical bias on a matrix and batch-specific basis. Matrix spikes are analyzed with metal, organic and selected conventional parameters (see Table 2).

Laboratory Replicate Samples
Replicate analysis (laboratory duplicates or triplicates) is used as an indicator of method precision and is used to qualify data on an analyte and batch-specific basis. Not all replicate data are used, however, as an indicator for data qualification. Only sets of replicate results that include at least one result significantly greater than the RDL (or the MDL if no RDL is present) are considered for data qualification. These guidelines have been used to account for the fact that precision obtained near the detection limit is not representative of precision obtained throughout the entire analytical range.

Surrogates
Surrogate recoveries have been used to evaluate possible low or high analytical bias on a sample-specific basis. Surrogates are analyzed for organic parameters with the exception of methyl mercury.

Data Qualifiers
The data qualification system used for this data submission is presented in Table 3. These data qualifiers address situations that require qualification and generally conform to QA1 guidance. The KC Laboratory qualifiers indicating <MDL and <RDL have been used as replacements for the *T* and *U* qualifier flags specified under QA1 guidance. Changes made to SRM data qualification have been discussed with and approved by the Sediment Management Unit of Ecology.

Units and Significant Figures
Data have been reported in accordance with laboratory policy at the time of data generation. When an RDL and MDL are reported, data have been reported to three significant figures above the RDL and two significant figures equal to or below the RDL. Data with only an MDL have been reported to two significant figures. PSD results are reported to three significant figures.

CONVENTIONAL ANALYSES

Completeness
Conventional data are reported for samples L15421-1 through L15421-4 (Table 1). These samples were analyzed for total organic carbon (TOC), total solids, and particle size distribution (PSD) in association with the complete set of QC samples outlined in Table 2.

Subcontracted Analyses
PSD analysis was subcontracted to AmTest, Inc. in Redmond, Washington.

Methods
PSD analysis was performed in accordance with ASTM and Puget Sound Protocols methodologies (*Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound* - page 9 - PSEP, 1986). TOC analysis was performed in accordance with Standard Method (SM)5310-B. Total solids analysis was performed in accordance with SM2540-G.

Detection Limits, Units and Significant Figures
For analyses performed at the KC Laboratory, data are reported in accordance with laboratory policy at the time the data were generated. A positive result and/or MDL and RDL have been reported for all conventional parameters analyzed by the KC Laboratory. Data are reported to three significant figures for results greater than the RDL and two significant figures for results equal to or less than the RDL. For results reported with less than two or three significant figures, significant zeroes are implied. This may not apply to subcontracted data.

Storage Conditions and Holding Times
Sample storage conditions and holding times have been evaluated using guidelines established during the Third Annual PSDDA Review Meeting. The criteria used to evaluate storage conditions and holding times for conventional analyses are listed in the table below.

Parameter	Holding Time at 4°C	Holding Time at -18°C
Particle Size Distribution	6 Months	Not Recommended
Solids	14 Days	6 Months
Total Organic Carbon	14 Days	6 Months

Sample storage conditions and holding times were met for all samples in this data submission.

Method Blanks
Method blanks were analyzed in connection with total solids and TOC analyses. All method blanks results were less than the MDL.

Standard Reference Material (SRM)
An SRM (Buffalo River Sediment) was analyzed in connection with TOC analysis. The percent recovery for the SRM analysis was within the 80 to 120% QC limits.

Matrix Spikes
Matrix spikes are not analyzed in connection with any of these conventional parameters.

Laboratory Replicate Samples
Laboratory triplicate samples were analyzed for all conventional parameters. The percent relative standard deviations (%RSD) for all triplicate sample results were less than or equal to the 20% QC limit. The overall %RSD for PSD was less than 20%.

METAL CHEMISTRY

Completeness
Metal chemistry data are reported for samples L15421-1 through L15421-4 (Table 1). These samples were analyzed for mercury and other metals in association with the complete set of QC samples outlined in Table 2.

Methods
Mercury analysis was performed in accordance with EPA Method 7471. Analysis for other metals was performed in accordance with EPA Method 3050A/6010B.

Target List
The reported target list includes all metals specified in *Table 1- Marine Sediment Quality Standards Chemical Criteria* and *Table 3- Puget Sound Marine Sediment Cleanup Screening levels Chemical Criteria* contained in Chapter 173-204 WAC. Additional metals have been reported as available.

Detection Limits, Units and Significant Figures
For analyses performed at the KC Laboratory, data are reported in accordance with laboratory policy at the time the data were generated. A positive result and/or MDL and RDL have been reported for all metals parameters analyzed by the KC Laboratory. Data are reported to three significant figures for results greater than the RDL and two significant figures for results equal to or less than the RDL. For results reported with less than two or three significant figures, significant zeroes are implied.

Storage Conditions and Holding Times
Sample storage conditions and holding times have been evaluated using guidelines established during the Third Annual PSDDA Review Meeting. The criteria used to evaluate storage conditions and holding times for metals analyses are listed in the table below.

Parameter	Holding Time at 4°C	Holding Time at -18°C
Mercury	Not Recommended	28 Days
Other Metals	6 Months	2 Years

Sample storage conditions and holding times were met for all samples in this data submission.

Method Blanks
All metals method blanks results were less than the MDL with the exception of iron. All sample results for iron which are less than 10x the method blank have been qualified with a *B* flag.

Standard Reference Material (SRM)
The SRM analyzed in association with samples included in this data submission is PACS 1 certified by the National Research Council of Canada (NRCC). This SRM does not contain silver. An SRM recovery less than the QC limit of 80% has not been used to qualify data because the digestion technique used for sample analysis is different from the technique used during analysis to determine the SRM values. Only SRM recoveries greater than 120% will be used to qualify data.

All metals SRM recoveries were less than the QC limit of 120% with the exception of cadmium. The reported cadmium SRM recovery was 148%. Associated cadmium sample results have been qualified with an *L* flag.

Matrix Spikes

All matrix spike recoveries were within the 75 to 125% QC limits with the exception of aluminum and manganese. The reported aluminum matrix spike recovery was 171% and the reported manganese matrix spike recovery was 55%. Associated sample results for these metals have been qualified with an *L* or a *G* flag, respectively.

Laboratory Replicate Samples

The relative percent differences (RPDs) for laboratory duplicate sample results for all metals were less than or equal to the QC limit of 20%. RPd was not calculated if either one or both of the results was <MDL.

ORGANIC CHEMISTRY

Completeness
Organic chemistry data are reported for samples L15421-1 through L15421-4 (Table 1). These samples were analyzed for base/neutral/acid semivolatile organic compounds (BNAs), chlorobenzenes and polychlorinated biphenyls (PCBs) in association with the complete set of QC samples outlined in Table 2.

Methods
BNA analysis was performed in accordance with EPA Method 8270. A portion of the BNA extract was analyzed by selected ion monitoring (SIM) to attain lower detection limits for chlorobenzene compounds. PCB analysis was performed in accordance with EPA Method 8082.

Target List
The reported BNA target list includes all compounds specified in *Table 1 - Marine Sediment Quality Standards Chemical Criteria* and *Table 3 - Puget Sound Marine Sediment Cleanup Screening Levels Chemical Criteria* contained in Chapter 173-204 WAC with the exception of benzo(j)fluoranthene. The KC Laboratory has verified that analytical conditions are sufficient to calculate a total benzofluoranthene result using the reported *b* and *k* isomers.

The reported chlorobenzene target list includes, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, and hexachlorobenzene.

Reported PCB data include Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260.

Detection Limits, Units and Significant Figures
For analyses performed at the KC Laboratory, data are reported in accordance with laboratory policy at the time the data were generated. A positive result and/or MDL and RDL have been reported for all organic parameters analyzed by the KC Laboratory. Data are reported to three significant figures for results greater than the RDL and two significant figures for results equal to or less than the RDL. For results reported with less than two or three significant figures, significant zeroes are implied.

Storage Conditions and Holding Times
Sample storage conditions and holding times have been evaluated using guidelines established during the Third Annual PSDDA Review Meeting. The criteria used to evaluate storage conditions and holding times for organics analyses are listed in the table below.

Parameter	Holding Time at 4°C	Holding Time at -18°C
BNAs & Chlorobenzenes	14 Days to Extract 40 Days to Analyze	1 Year to Extract 40 Days to Analyze
PCBs	14 Days to Extract 40 Days to Analyze	1 Year to Extract 40 Days to Analyze

Sample storage conditions and holding times were met for all samples in this data submission.

Method Blanks
All BNA, chlorobenzene, and PCB method blank results were less than the MDL.

Surrogate Recoveries
BNA sample data are qualified when the average surrogate recovery for either or both the acid and base/neutral fractions are outside the 50 to 150% QC limits. Average base/neutral fraction surrogate recoveries were within QC limits for all samples in this data submission. The average acid surrogate fraction recoveries were outside the 50 to 150% QC limits for all samples. Associated acid fraction BNA sample results have been qualified with a *G* flag.

Chlorobenzene sample data are qualified when the single surrogate recovery is outside QC limits. All Chlorobenzene surrogate recoveries were below the 50 to 150% QC limits for all samples in this data submission with the exception of the blank spike duplicate.

PCB sample data are qualified when both surrogate recoveries are outside the 50 to 150% QC limits. At least one PCB surrogate recovery was within QC limits for all samples in this data submission.

Standard Reference Material (SRM)
The sediment SRM analyzed in association with the reported BNA results is 1941a, certified by the National Institute of Standards and Technology (NIST). SRM 1941a contains a partial list of compounds for BNA analysis. BNA results for all samples in this data submission have been qualified based on the SRM recoveries outside the 80 to 120% QC limits, summarized in the following table.

Compound	% Recovery	Flag
Naphthalene	19	G
Fluorene	21	G
Phenanthrene	69	G
Anthracene	65	G
Fluoranthene	66	G
Pyrene	72	G
Benzo(a)anthracene	69	G
Benzo(a)pyrene	59	G
Indeno(1,2,3-c,d)pyrene	41	G
Dibenzo(a,h)anthracene	60	G
Benzo(g,h,i)perylene	25	G

The sediment SRM analyzed in association with the reported PCB results is HS-2, certified by the NRCC. SRM HS-2 contains Aroclor 1254. The SRM recovery for Aroclor 1254 was within the 80 to 120% QC limits.

A sediment SRM is not available for chlorobenzene compounds.

Matrix Spikes
BNA results for all samples in this data submission have been qualified based on the matrix spike recoveries outside the 50 to 150% QC limits, summarized in the following table.

Compound	% Recovery	Flag
Phenol	33	G
Bis(2-Chloroethyl)ether	34	G
2-Chlorophenol	38	G
Bis(2-Chloroisopropyl)ether	34	G
N-Nitrosodi-N-Propylamine	45	G
Hexachloroethane	44	G
Nitrobenzene	46	G
Isophorone	31	G
2-Nitrophenol	43	G
2,4-Dimethylphenol	3	X
Bis(2-chloroethoxy)methane	46	G
2,4-Dichlorophenol	49	G
Naphthalene	47	G
Hexachlorobutadiene	45	G
Hexachlorocyclopentadiene	26	G
Benzidine	0	X
3,3'-Dichlorobenzidine	0	X
Aniline	0	X
Benzyl Alcohol	22	G
2-Methylphenol	30	G
4-Methylphenol	31	G
4-Chloroaniline	20	G
2-Methylnaphthlene	49	G
3-Nitroaniline	34	G
4-Nitroaniline	39	G
Coprostanol	44	G

Chlorobenzene results for all samples in this data submission have been qualified based on the matrix spike recoveries outside the 50 to 150% QC limits, summarized in the following table.

Compound	% Recovery	Flag
1,3-Dichlorobenzene	49	G
1,4-Dichlorobenzene	48	G
1,2,4-Trichlorobenzene	43	G

Aroclor 1260 is used as the spiking compound for PCB analysis. The Aroclor 1260 matrix spike recovery was within the 50 to 150% QC limits.

Laboratory Replicate Samples
The RPDs for all BNA, chlorobenzene, and PCB laboratory duplicate sample results were less than or equal to the 100% QC limit.

TABLE 1
NORFOLK SEDIMENT BACKFILL MONITORING PROJECT
MARINE SEDIMENT SAMPLE INVENTORY

Sample	Locator	PSD	Solids	TOC	Metals	ClrBenz	BNAs	PCBs	Comments
L15421-1	NFK501	X	X	X	X	X	X	X	0 to 10cm sample
L15421-2	NFK502	X	X	X	X	X	X	X	0 to 10cm sample
L15421-3	NFK503	X	X	X	X	X	X	X	0 to 10cm sample
L15421-4	NFK504	X	X	X	X	X	X	X	0 to 10cm sample

TABLE 2
QC SAMPLE FREQUENCY FOR SEDIMENT CHEMICAL AND PHYSICAL PARAMETERS

Parameter	Method Blank	Duplicate	Triplicate	Matrix Spike	SRM or Check Standard	Surrogates
PSD	No	10% of samples	10% of samples	No	No	No
Total Solids	1 per QC batch	5% minimum, 1 per QC batch	5% minimum, 1 per QC batch	No	No	No
TOC	1 per QC batch	5% minimum, 1 per QC batch	5% minimum, 1 per QC batch	No	1 per QC batch	No
Metals	1 per QC batch	5% minimum, 1 per QC batch	No	5% minimum, 1 per QC batch	1 per QC batch	No
BNAs	1 per QC batch	5% minimum, 1 per QC batch	No	5% minimum, 1 per QC batch	1 per QC batch	Yes
Chlorobenzenes	1 per QC batch	5% minimum, 1 per QC batch	No	5% minimum, 1 per QC batch	No	Yes
PCBs	1 per QC batch	5% minimum, 1 per QC batch	No	5% minimum, 1 per QC batch	1 per QC batch	Yes

TABLE 3
SUMMARY OF SEDIMENT DATA QUALIFIERS

Condition to Qualify	King County Data Qualifier	Organics QC Limits	Metals QC Limits	Conventionals QC Limits	Comment
very low matrix spike recovery	X	< 10 %	< 10 %	< 10 %	
low matrix spike recovery	G	< 50%	< 75%	< 75%	
high matrix spike recovery	L	> 150%	>125%	>125%	
low SRM recovery	G	< 80%*	NA	< 80%*	
high SRM recovery	L	>120%*	>120%*	>120%*	
high duplicate RPD	E	>100 %	>20%	> 20 %	use duplicate as routine QC for organics
high triplicate RSD	E	NA	NA	> 20 %	use triplicate as routine CC for conventionals
less than the reporting detection limit	< RDL	NA	NA	NA	
less than the method detection limit	< MDL	NA	NA	NA	
contamination reported in blank	B	> MDL	> MDL	> MDL	
very biased data, based on surrogate recoveries	X	all fraction surrogates are <10%	NA	NA	use average surrogate recovery for BNA
biased data, based on low surrogate recoveries	G	all fraction surrogates are < 50%	NA	NA	use average surrogate recovery for BNA
biased data, based on high surrogate recoveries	L	all fraction surrogates are >150%	NA	NA	use average surrogate recovery for BNA
estimate based on presumptive evidence	J# used to indicate the presence of TICs	NA	NA	NA	TICs - Tentatively Identified Compounds
rejected, unusable for all purposes	R	NA	NA	NA	
a sample handling criteria has been exceeded	H	NA	NA	NA	includes container, preservation, hold time, sampling technique

*Note that PSDDA guidance uses a 95% confidence window for this parameter/qualification.

CONVENTIONAL ANALYSES QC DATA

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 06/15/1999 12:20
Run ID: R29943 Workgroup: WG42878 (TOC Sediment)

SRM:WG42878-1 Matrix: OTHR SOLID Listtype: CVTOC Method: SM5310-B (03-04-002-000) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Organic Carbon	5	10	mg/Kg		33480	32600	97		80-120			

MB:WG42878-2 Matrix: BLANK WTR Listtype: CVTOC Method: SM5310-B (03-04-001-000) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Total Organic Carbon	.5	1	mg/L	<MDL	

LD:WG42878-3 LT:WG42878-4 L15421-1 Matrix: SALTWTRSED Listtype: CVTOC Method: SM5310-B (03-04-002-000) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	Truevalue	LT Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Organic Carbon	5	10	mg/Kg	1350		1310					1220				5		35

SRM:WG42878-5 Matrix: OTHR SOLID Listtype: CVTOC Method: SM5310-B (03-04-002-000) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Organic Carbon	5	10	mg/Kg		33480	32800	98		80-120			

MB:WG42878-6 Matrix: BLANK WTR Listtype: CVTOC Method: SM5310-B (03-04-001-000) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Total Organic Carbon	.5	1	mg/L	<MDL	

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 06/15/1999 12:20
Run ID: R29552 Workgroup: WG42906 (tots)

MB:WG42906-1 Matrix: BLANK WTR Listtype: CVTOTS Method: SM2540-B (03-01-007-001) Project 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Total Solids	.5	1	mg/L	<MDL	

LD:WG42906-2 LT:WG42906-3 L15421-4 Matrix: SALTWTRSED Listtype: CVTOTS Method: SM2540-G (03-01-007-001) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	Truevalue	LT Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Solids	.005	.01	%	77.6		77.8					78.5				1		35

Sediment Particle Size Distribution QC data

Particle size				Average	SD	%RSD	Ave %RSD
-2	<0.1	<0.1	<0.1	#DIV/0!	#DIV/0!	#DIV/0!	
-1	0.4	0.4	0.1	0.3	0.173205	57.73503	
0	1	1.1	1.3	1.133333	0.152753	13.47816	
+1	28	24.8	26.9	26.56667	1.625833	6.119824	
+2	55	56.2	56.9	56.03333	0.960902	1.714876	
+3	9	8.5	9.2	8.9	0.360555	4.051181	
+4	1.3	1.3	1.4	1.333333	0.057735	4.330127	
+5	5.4	7.7	4	5.7	1.868154	32.77463	17.17198
+6	<0.1	<0.1	<0.1	#DIV/0!	#DIV/0!	#DIV/0!	
+7	<0.1	<0.1	<0.1	#DIV/0!	#DIV/0!	#DIV/0!	
+8	<0.1	<0.1	<0.1	#DIV/0!	#DIV/0!	#DIV/0!	
+9	<0.1	<0.1	<0.1	#DIV/0!	#DIV/0!	#DIV/0!	
+10	<0.1	<0.1	<0.1	#DIV/0!	#DIV/0!	#DIV/0!	
>+10	<0.1	<0.1	<0.1	#DIV/0!	#DIV/0!	#DIV/0!	

AMTEST
LABORATORIES

AmTest Inc.

14603 N.E. 87th St.
Redmond, WA
98052

Tel: 425 885 1664

Fax: 425 883 3495

May 4 1999

King County WPCD Env. Lab.
Subcontracting Dept. MS-LAB
322 West Ewing Street
Seattle, WA 98119-1507
Attention: Fritz Grothkopp

Dear Fritz Grothkopp:

Enclosed please find the analytical data for your project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AM TEST ID	TEST
L15421-1	Sediment	99-A006406	CONV, GR SIZE,
L15421-2	Sediment	99-A006407	CONV, GR SIZE,
L15421-3	Sediment	99-A006408	CONV, GR SIZE,
L15421-4	Sediment	99-A006409	CONV, GR SIZE,

Your four (4) samples were received on Monday, April 26 1999. This was a total of 72 hours (3 days) after sample collection (4/23/99). At the time of receipt, the samples were logged in and properly maintained prior to their subsequent analyses.

The analytical procedures used at Am Test are well documented, and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the QC results and "Methodology Report". This table includes information relative to the detection limits, analyses dates and method references.

Please note that the detection limits that are listed in the body of the report refer to the Method Detection Limits (MDL's), as opposed to Practical Quantitation Limits (PQL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Mark A. Fugiel
General Manager

Project #: 423056-160
PO Number: 108677

BACT = Bacteriological
CONV = Conventionals

MET = Metals
ORG = Organics